NON-PUBLIC?: N
ACCESSION #: 8907310204
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Seabrook Station PAGE: 1 of 5

DOCKET NUMBER: 05000443

TITLE: Manual Reactor Trip during Natural Circulation Test
EVENT DATE: 06/22/89 LER #: 89-008-00 REPORT DATE: 07/24/89

OPERATING MODE: 2 POWER LEVEL: 003

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Chris Beverly, Associate TELEPHONE: (603) 474-9521
Engineer, extension 4442

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: JI COMPONENT: PCV MANUFACTURER: C635
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On June 22, 1989, a manual reactor trip was initiated while conducting a Natural Circulation Test.

Shortly after tripping the reactor coolant pumps, as per the Natural Circulation Test procedure, one of the condenser steam dump valves being used to control temperature failed to the full open position. This open valve caused an increased steam demand which initiated an unplanned plant cooldown. This cooldown caused the pressurizer level to decrease below the 17% manual trip criteria specified in the startup test procedure. Due to the Unit Shift Supervisor's misinterpretation of the test procedure trip criteria, the plant was not manually tripped at that time. When the steam dump valve, MS-PV-3011, was closed, the previously decreasing pressurizer pressure and pressurizer level began increasing. Both pressurize pressure and level continued to increase until the pressurizer pressure, at 2310 psig, approached the test procedure manual trip criterion of 2340 psig and a manual reactor trip was initiated at 12:36pm.

The cause of MS-PV-3011 failing to the full open position has been determined to be the positioner feedback linkage which became disconnected during the test. Corrective action for this valve and similar valves is being scheduled.

The startup test program will be revised to require that a more comprehensive pre-test briefing be provided and a determination be made of which tests require special classroom and/or simulator review. In addition, the New Hampshire Yankee (NHY) policy related to procedure compliance will be further improved.

END OF ABSTRACT

On June 22, 1989 at 12:36pm EDT, while conducting the Natural Circulation

Test (1-ST-22), an unplanned plant cooldown transient occurred and a manual reactor trip was initiated. The unplanned plant cooldown was the result of the failure, to the full open position, of the secondary side condenser steam dump valve, MS-PV-3011

Sequence of Events

At 12:19pm, the Natural Circulation Test was initiated with the tripping of the reactor coolant pumps (RCP). At that time, the pressurizer pressure, pressurizer level, steam generator level, rod control and steam dump control systems were all in manual control per the test procedure. Reactor Power was at approximately 3% with the Group A turbine drains and the main steam upstream drains open.

The condenser steam dump valves, that were being used to control Reactor Coolant System (RCS) temperature, closed at 12:25, in response to an expected Lo-Lo Tavg interlock signal. The interlock was bypassed to regain control of the steam dump cooldown valves; MS-PV-3011, MS-PV-3015 (blocked closed), and MS-PV-3019. This action caused the valves to cycle open and closed while returning to their interlock position of approximately 5%. MS-PV-3019 cycled for approximately 40 seconds before remaining closed. This valve cycling caused an increased steam demand and accelerated the decrease of pressurizer pressure and pressurizer level trends.

Six seconds after MS-PV-3019 closed, MS-PV-3011 failed to-the full open position. This mode of failure was verified by local observation. Pressurizer pressure and pressurizer level continued to decrease due to steam demand, even though Chemical and Volume Control System (CVCS) letdown viis at minimum (10gpm) and charging was almost at maximum (122gpm).

At 12:29, pressurizer level decreased below 17%, which-is the test procedure manual trip criteria. CVCS letdown isolated and the pressurizer heaters tripped in accordance with the design. Due to the Unit Shift Supervisor's misinterpretation of the test procedure trip criteria, the plant was not manually tripped at that time.

At 12:31, the unplanned cooldown was terminated when MS-PV-3011 was closed. The minimum values that pressurizer level and pressurizer pressure reached during the cooldown were 14.5% and 2179 psig respectively. When MS-PV-3011 was closed a rapid recovery of pressurizer level and pressure began.

At 12:33 Tavg decreased below 541 deg. F, which began a 15 minute requirement to restore Tavg above 541 deg. F or be in hot standby within the next 15 minutes.

At 12:34, pressurizer level increased above 17% and the letdown isolation and, the pressurizer heater trip reset. At 12:36, pressurizer level was at 21%, pressurizer pressure was at 2310 psig and was increasing at a rate of approximately 30 psig per minute. At this time the reactor was manually tripped, prior to pressurizer pressure reaching the 2340 psig manual trip criterion of 1-ST-22. The

operating crew immediately entered Emergency Procedure E-0, "Response to Reactor Trip," and the plant was placed in a stable condition.

Plant Conditions

At the time the reactor trip was initiated pressurizer level was at 21% and increasing, pressurizer pressure was at 2310 psig and increasing, Tavg was 540 deg. F and increasing and reactor power level was at approximately 2.5%

The chart below provides information regarding initial conditions and transient conditions.

Parameter, Units	Initial Value	Transient Min. Value	Transient Max. Value
Reactor Power, %	3%** est	1.5% est	2.5%
Pzr Pressure, psig	2237	2179	2310

Pzr Level, % 25 14.5 25*

Charging Flow, gpm 70 70* 125

Letdown Flow, gpm 60 0 60 *

Wide Range Thot, deg. F 557 554 572

Wide Range Thot, deg. F 554 522 554*

Wide Range Tavg, deg. F 556 539 560

S/G narrow range level, % 53 48 57

**intermediate range *initial value

Safety Consequences

During the transient, all systems, with the exception of steam dump valve MS-PV-3011, functioned as designed. At no time did reactor power increase above its initial value, nor were any Technical Specification or design limits exceeded. Pressurizer level remained well above the 5% pressurizer level manual safety injection value and pressurizer pressure, although increasing, never reached the automatic trip setpoint of 2385 psig. At no time during the transient was there any adverse impact on the health and safety of the public, nor did unreviewed safety questions exist.

Root Cause

The unplanned plant cooldown during the Natural Circulation Test was due to MS-PV-3011 (Copes-Vulcan: Model D100-160) failing to its full open position. When MS-PV-3011 failed to the full open position, the increased steam demand caused pressurizer level to decrease at a rate faster than the charging system could maintain. This cooldown continued until MS-PV-3011 was closed.

Maintenance inspection of MS-PV-3011 determined that the valve had failed

full open because the position feedback linkage was found disconnected from the positioner. Without position feedback, any open signal received from the control system would result in the valve continuing to travel to the full open position. Several personnel observed MS-PV-3011 position indication

functioning as expected early in the test and the plant computer recorded

several cycles of valve operation. It has been determined that the linkage did in fact become disconnected during the test.

There were two causes for the linkage becoming disconnected. The screw connecting the positioner arm to the connecting link assembly was not long enough to allow full thread engagement of the nut on the screw. Additionally,

the ball joint on the connecting linkage was stiff, causing the screw and nut to rotate when the valve was stroked. This rotation eventually resulted in the nut loosening and falling off.

The Unit Shift Supervisor did not manually trip the reactor because he misinterpreted the 17% pressurizer level value to be test termination guidance, which was more conservative than the 52 pressurizer level safety injection requirement provided in Station procedures. The pre-test briefing given to the crew performing the Natural Circulation Test was not effective. The required information was presented to the.crew but the requirement to perform a manual reactor trip at 172 pressurizer level was not fully understood.

Corrective Action

The steam dump valves have been inspected and evaluated to determine the cause of failure. The required corrective action will be determined and a schedule for completion of the corrective action will be completed by July 28, 1989.

As a result of this evaluation, modifications will be made to the positioner feedback linkage to ensure a positive locking arrangement. All valves will be tested subsequent to modifications to verify proper and reliable operation.

The routine maintenance frequency and the post-maintenance testing criteria for the steam dump valves will be re-evaluated and any appropriate changes made by August 31, 1989.

All similar valves installed in the plant will be examined for similar problems and an appropriate schedule for corrective action will be developed.

In addition, the maintenance program will be evaluated to ensure that sufficient emphasis is placed upon post-maintenance testing and visual inspection.

The Startup Test Program will be revised to require that a more

comprehensive pre-test briefing be provided prior to the test crew assuming the shift. In addition, the Startup Test Program will be reviewed to determine which tests require special classroom review and/or simulator rehearsals for the test crews prior to the test being conducted.

The NHY policy related to procedure compliance will be further improved to better define the conduct expected of all NHY personnel related to procedure compliance, and training will be provided to all NHY personnel on the enhanced NHY procedure compliance policy.

This is the first event of this type at Seabrook Station.

ATTACHMENT 1 TO 8907310204 PAGE 1 OF 2

New Hampshire
Yankee
NYN-89094

July 24, 1989

United States Nuclear Regulatory Commission
Washington, DC 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-67, Docket No. 50-443

Subject: Licensee Event Report (LER) No. 89-008-00: Manual Reactor Trip during Natural Circulation Test

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 89-008-00 for Seabrook Station. This submittal documents an event which occurred on June 22, 1989, and is being reported pursuant to 10CFR50.73(a)(2)(iv). Information

regarding a procedure violation associated with this event, and an evaluation of personnel performance during and following the transient are presented in New Hampshire Yankee letter NYN-89086 dated July 12, 1989, "New Hampshire Yankee Performance During and Following the Natural Circulation Test," E. A. Brown to W. T. Russell.

Should you require further information regarding this matter, please contact Ms. Christine L. Beverly at (603) 474-9521, extension 4442.

Very truly yours,

Ted C. Feigenbaum
Senior Vice President
and Chief Operating Officer

Enclosures: NRC Forms 366, 366A

New Hampshire Yankee Division of Public Service Company of New Hampshire
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